

CRUISE RESULTS
Fisheries Research Vessel DELAWARE II
Cruise No. DE 03-05
Ecosystems Monitoring Survey

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CRUISE PERIOD AND AREA

The cruise period was from 24 to 30 May 2003. The research vessel DELAWARE II covered the Georges Bank and part of the Gulf of Maine regions (Figure 1) for the Late Spring dedicated Ecosystems Monitoring Survey.

OBJECTIVES

This cruise had three objectives. The primary objective was to assess the changing biological and physical properties of the Georges Bank portion of the Northeast Continental Shelf ecosystem, which influence the sustainable productivity of the living marine resources. A secondary objective was to determine the extent of the influx of Labrador Slope Water into the Gulf of Maine region through the Northeast Channel based on the presence of lower salinity, lower temperature and lower nutrient level water. The third cruise objective involved the following sampling:

- collection of phytoplankton samples for nitrogen stable isotope ratios,
- collection of samples for zooplankton genetics (genome) studies,
- examination of plankton samples at sea for concentrations of Calanus finmarchicus to correlate with right whale sightings.

METHODS

The survey consisted of 30 randomly distributed stations on Georges Bank and 14 standard MARMAP stations in the Gulf of Maine at which the vessel slowed or stopped to lower instruments over the side.

Key parameters which were measured included water column temperature, salinity, and chlorophyll-a fluorescence, ichthyo- and zooplankton composition, abundance and distribution and inorganic nutrient

concentrations; along-track temperature, salinity, chlorophyll-a fluorescence and standard weather observations.

A double oblique plankton tow using the 61-centimeter Bongo sampler and a CTD profiler was made at all stations on Georges Bank, and at six stations in the Gulf of Maine. The tow was made to approximately 5 meters above the bottom, or to a maximum depth of 200 meters, at a ship speed of 1.5 knots. Plankton sampling gear consisted of a 61-centimeter mouth diameter aluminum bongo frame with two 333-micron nylon mesh nets. A 45-kilogram lead ball was attached by an 80-centimeter length of 3/8-inch diameter chain below the aluminum Bongo frame to depress the sampler. A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. The plankton sampling gear was deployed over the port stern quarter of the vessel by means of a conducting-cable winch and a boom. Plankton samples were preserved in a 5 percent solution of formalin in seawater. Tow depth was monitored in real time with a Seabird CTD profiler, which was hard-wired to the conductive towing cable, providing simultaneous depth, temperature, salinity and chlorophyll-a fluorescence data for each plankton tow.

Continuous monitoring of the seawater temperature, salinity, and chlorophyll-a level, at a depth of 2 meters was done along all of the cruise track by means of a thermosalinograph, and a flow-through fluorometer.

The thermosalinograph and flow-through fluorometer were connected to the Scientific Computing System installed in the laboratory area of the vessel by Atlantic Marine Center personnel. This system recorded output from the thermosalinograph, and the fluorometer every ten seconds, and gave the data records a time-date stamp from the GPS unit.

Samples for Seabird CTD salinity calibration data were obtained on the 12-6 watch by taking a water sample from 5 meters above the bottom using a 1.7 liter Niskin bottle at every fifth or sixth station. CTD fluorescence calibration on Georges Bank was done by getting a 200 ml sample from the water bottle 5 meters above the bottom and from the flow-through calibration water outflow (to represent a near-surface sample). In the Gulf of Maine, CTD fluorescence calibration was done in the same manner but with the addition of a mid-water Niskin bottle. Calibration of the thermosalinograph and fluorometer from the surface flow-through system was undertaken on the 6-12 watch following the protocol outlined in the Ecosystem Monitoring Program Operations Manual.

Eight phytoplankton samples for nitrogen-stable isotope ratio analysis were collected from the discharge water of the near-surface flow-through system. Samples of either eight hundred or one thousand milliliters of seawater were pre-filtered through 300 micron mesh nitex gauze to remove most zooplankton, then filtered through a Whatman GFF glass-fiber filter and immediately frozen for analysis

ashore.

Water samples for inorganic nutrient samples were collected from 6 stations on Georges Bank. At these stations samples were collected using a Niskin bottle placed 5 meters above the bottom, and from the near-surface water collected by the flow-through system. In the Gulf of Maine nutrient samples were collected at 14 stations following the same protocol used on Georges Bank but with the addition of a mid-water sample. Sixty milliliters of water from each sample were filtered through a Millipore filter and then frozen for analysis at the University of Maine for nitrates, nitrites, phosphates, silicates and ammonia.

Zooplankton genetics samples were collected at four randomly selected stations within each of the two regions by means of a 20 cm bongo frame equipped with two 165 micron mesh nets attached to the towing wire 30 cm above the CTD with a wire stop. The samples were preserved in 95% ethanol which was changed once after 24 hours.

RESULTS

A summary of routine survey activities is presented in Table 1. The areal coverage of the cruise is shown in Figure 1. The DELAWARE II sailed at 1000 hours EDT on Saturday, May 24, 2003 and proceeded east via Great Round Shoal towards Georges Bank. While en route, sampling commenced at a Gulf of Maine station in the early evening, then was delayed for several hours shortly after its completion by a fast-moving storm with winds of up to 50 knots. Sampling resumed the next morning on Georges Bank, and continued without interruption for the remainder of the cruise. The Delaware II worked eastward across Georges Bank, completing work there late on Wednesday, May 27. The vessel then proceeded north into the Gulf of Maine and commenced sampling there on May 28. Sampling in the Gulf of Maine was conducted from east to west. Due to the lack of time, only the southern portion of the Gulf was covered, with the northern-most station being in Jordan Basin. One station in the western Gulf of Maine near Cashes Ledge was dropped and another substituted at the end of the cruise to maximize sampling in the time allotted for the cruise. Sampling was completed at 1930 EDT on May 29. The vessel returned to Woods Hole via Great Round Shoals and docked in Woods Hole at 0640 EDT on May 30, 2003. With the exception of one station substitution, all cruise objectives were met and the cruise completed within the time allotted, due mainly to mostly calm weather and flawless performance from the equipment and personnel aboard the vessel.

DISPOSITION OF SAMPLES AND DATA

The 61-cm bongo samples and data were delivered to the Ecosystems

Monitoring Group of the NEFSC, Narragansett, RI, for quality control processing and further analysis. The nitrogen isotope samples were kept frozen and delivered to Rick McKinney at the US EPA Lab in Narragansett, RI. The inorganic nutrient samples were taken to the NMFS lab in Woods Hole and stored in a freezer for eventual delivery to David Townsend at the University of Maine. The zooplankton genetics samples were picked up from the DELAWARE II by Nancy Copley of the Woods Hole Oceanographic Institute, and the CTD data was delivered to the Oceanography Branch of the NEFSC, Woods Hole, MA with copies of the CTD logs and header file going to the Ecosystems Monitoring Group in Narragansett.

SCIENTIFIC PERSONNEL

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Table 1. STATION OPERATION REPORT FOR CRUISE DE0305

CAST	STA.	Date (GMT)			TIME (GMT)		LAT	LONG	DEPTH (m)	OPER.
		mm	dd	yy	hr	min				
1	1	5	24	2003	21	50	4139.5	6909.5	170	W, nut
2	2	5	25	2003	12	05	4117.2	6818.2	55	B
3	3	5	25	2003	13	14	4120.1	6806.8	22	B,Z1
4	4	5	25	2003	15	26	4059	6813	55	B
5	5	5	25	2003	17	09	4057.7	6830.5	39	W,Z2, nut, chl
6	5	5	25	2003	17	20	4057.4	6830.7	44	B
7	6	5	25	2003	19	02	4045	6822.1	60	B,Z3
8	7	5	25	2003	21	02	4038.6	6845.5	62	B,CO 106cc
9	8	5	25	2003	23	29	4026.6	6823.7	97	B,CO 132cc
10	9	5	26	2003	0	50	4017	6826.1	139	B
11	10	5	26	2003	3	15	4026.5	6759.6	138	B,N2,CO 79cc
12	11	5	26	2003	5	55	4035.9	6735.3	94	W, nut, chl
13	11	5	26	2003	5	58	4035.8	6735.4	94	B,CO 317 cc
14	12	5	26	2003	7	08	4039.5	6746.8	77	B,CO 211cc
15	13	5	26	2003	10	33	4108.9	6730.2	53	B
16	14	5	26	2003	13	04	4047.8	6720.3	89	B
17	15	5	26	2003	15	18	4100.5	6701.4	69	B,CO 317 cc
18	16	5	26	2003	18	27	4117.5	6632.3	90	W, nut, chl
19	16	5	26	2003	18	33	4117.5	6632.4	91	B,CO 422cc
20	17	5	26	2003	20	01	4121.4	6648.9	71	B
21	18	5	26	2003	21	46	4128.1	6710.1	52	B
22	19	5	26	2003	22	57	4131.6	6724.7	35	B
23	20	5	27	2003	1	14	4136.4	6750.7	35	B,N3
24	21	5	27	2003	4	14	4155	6810.7	205	W, nut, chl
25	21	5	27	2003	4	26	4155.4	6810.9	209	B
26	22	5	27	2003	7	07	4150.6	6745.2	36	B
27	23	5	27	2003	9	30	4209.6	6734.7	183	W, nut, chl
28	23	5	27	2003	9	41	4209.6	6735	185	B,CO 211cc
29	24	5	27	2003	12	32	4150.6	6719.4	48	B
30	25	5	27	2003	14	39	4145.1	6653.5	64	B
31	26	5	27	2003	16	15	4156	6702	60	W, nut, chl
32	26	5	27	2003	16	20	4156	6702	57	B
33	27	5	27	2003	18	34	4209.5	6645	135	B
34	28	5	27	2003	20	04	4201.6	6636.2	77	B,Z4
35	29	5	27	2003	23	50	4139.7	6605.1	100	B,N4,CO 106cc
36	30	5	28	2003	1	51	4151.4	6547.1	146	B,CO 264cc
37	31	5	28	2003	2	50	4156.5	6542.1	246	B,CO 370cc
38	31	5	28	2003	3	21	4157.3	6541.6	243	V

Table 1. STATION OPERATION REPORT FOR CRUISE DE0305 (continued)

CAST	STA.	Date (GMT)			TIME (GMT)	LAT	LONG	DEPTH	OPER.
		mm	dd	yy	hr min			(m)	(B=bongo W=water Z=zoogen N=nitrogen chl=chlorophyll CO/=Calanus observed/vol RWO = Right Whales Observed nut=nutrients)
39	32	5	28	2003	6 05	4217.6	6551.1	217	W, nut, chl
40	32	5	28	2003	6 17	4217.4	6551.7	219	B,CO 185cc
41	33	5	28	2003	8 52	4216.7	6619.8	233	W, nut, chl
42	33	5	28	2003	9 05	4216.8	6619.9	233	B
43	34	5	28	2003	13 21	4246.4	6658.4	164	W, nut, chl
44	34	5	28	2003	13 32	4246.7	6658.7	155	B,Z5,CO 238 cc
45	35	5	28	2003	17 03	4301.1	6619.9	126	W, nut, chl
46	36	5	28	2003	20 25	4331.7	6619.8	70	W,N5, nut, chl
47	37	5	28	2003	23 27	4331.9	6659.8	211	W, nut, chl
48	38	5	29	2003	2 02	4342	6725.6	210	W, nut, chl
49	38	5	29	2003	2 15	4342	6725.5	208	B,Z6,CO 342 cc
50	39	5	29	2003	6 59	4259	6741.6	184	W, nut, chl
51	40	5	29	2003	10 40	4240.2	6818.8	201	W, nut, chl
52	41	5	29	2003	15 04	4210.2	6848	191	W, nut, chl
53	42	5	29	2003	18 21	4237.7	6913.9	222	W, nut, chl
54	42	5	29	2003	18 33	4237.7	6913.8	222	B,CO 739 cc, Z7 RWO
55	42	5	29	2003	19 03	4234.2	6913.2	218	W
56	43	5	29	2003	21 23	4229.9	6939.9	250	W, nut, chl
57	44	5	29	2003	23 12	4215.1	6943.1	217	W, nut, chl
58	44	5	29	2003	23 25	4215.3	6943	227	B,CO 342 cc, Z8

TOTALS: Bongo Casts = 36
Bongo Samples = 72
Water Samples = 19
CTD Casts = 58
Nitrogen samples = 8
Zoogen samples = 8
Inorganic nutrient samples = 56
Chlorophyll samples = 55
Calanus observations = 17
Right Whale Observations = 1

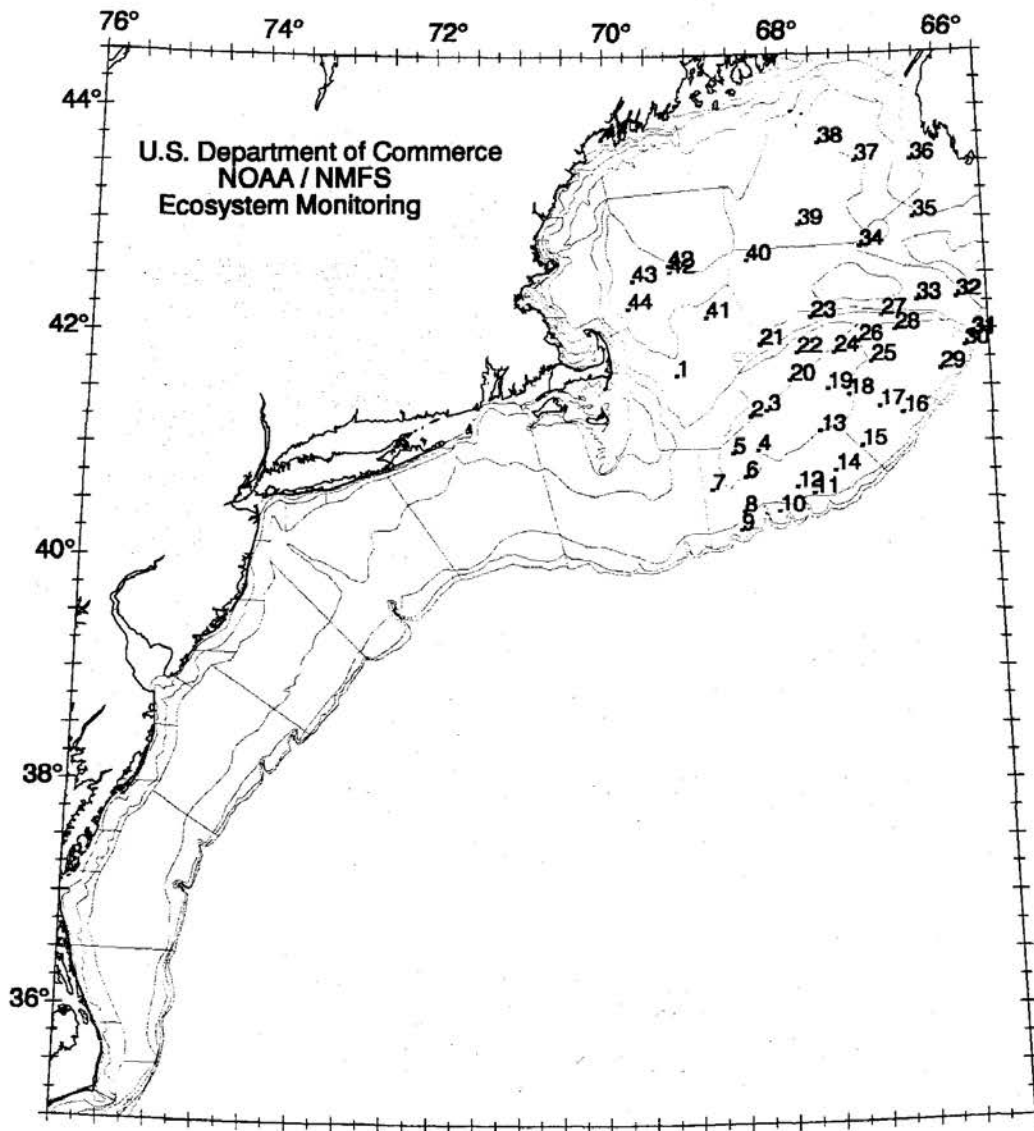


Figure 1. Station locations consecutively for Late Spring Cruise DE 03-05, 24 - 30 May 2003.

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